

Medical Education and Training: Building In-Country Capacity at All Levels

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ABSTRACT

Poorly trained workers and limited workforce capacity contribute immensely to barriers in cancer control in low- and middle-income countries (LMICs). Because of an increasing disease burden and the gap in trained personnel, it is critical that LMICs must develop appropriate in-country training programs at all levels to adequately address their cancer-related outcomes. The training in LMICs of cancer health personnel should address priority cancer diseases in the specific country by developing caregivers, trainers, researchers, and administrators at all levels of health care and all cadres of staff, from the community level to the national level. The Academic Model of Providing Access to Health care is a representative model of how a public tertiary hospital like the Moi Teaching and Referral Hospital in an LMIC setting can leverage its resources, collaborate with partners from high-resource countries, and assist in the development of a training center to spearhead a sustainable education program.

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INTRODUCTION

Poorly trained workers and limited workforce capacity contribute immensely to barriers in cancer control in low- and middle-income countries (LMICs).¹ For example, data from WHO in 2011 show that, in Kenya, there were fewer than two physicians and 120 nursing and midwife personnel per 100,000 people compared with the WHO standard of 20 physicians and 100 nurses.² Although there is inadequacy in the training of personnel across all health care fields, oncology training is of special importance. The worldwide incidence of cancer is projected to increase to greater than 21 million new patients in 2030, and two thirds of these new patients will reside in LMICs.³ Most countries in sub-Saharan Africa do not have formal in-country cancer training programs, and their undergraduate medical curricula have minimal to no cancer coverage. Because of the increasing disease burden and because of the gap in trained personnel, it is critical that LMICs must develop adequate training programs at all levels to adequately address cancer-related outcomes. With this current paucity of manpower, cancer care in most of these LMICs is haphazard and is concentrated on acute response instead of strategic planning to address issues of prevention, early detection, diagnosis, treatment, palliative care, and survivorship.

Traditionally, such training in LMICs has concentrated on high-level trainees who commonly

emigrate to countries in Asia, Europe, or America to acquire the necessary knowledge and skills in various cancer-related disciplines, such as medical oncology, radiation oncology, surgical oncology, gynecologic oncology, and cancer research. This has led to a brain drain, in which these well-trained professionals typically do not return to their home countries where expertise in care delivery, education, and research are most needed.⁴⁻⁶ WHO has recognized this as a major problem that propagates imbalances in the global health workforce.⁷

Longitudinal tracking of physicians entering the United States indicated that few international medical graduates ever leave the United States after their residency training.⁸ Therefore, establishment of in-country training opportunities at all levels encourages retention, increases capacity, expands career growth opportunities, and provides leadership in critical areas of need and resource allocation. This has been done, for instance, with research capacity strengthening in response to the HIV epidemic, in which multiple research partnerships have been realized.⁹ In addition, the Medical Education Partnership Initiative includes 40 medical schools in sub-Saharan Africa that were joined with 20 medical schools in the United States to foster communities of practice that created structure and shared resources in education, monitoring, evaluation, and research.¹⁰ Another example is the in-country training of obstetricians and gynecologists in Ghana, which led to the high retention of specialists attributed to

the viable training program, the economic viability after training, and the social commitment of the graduates.¹¹

The training in LMICs of cancer health personnel should address priority cancer diseases in the specific country by developing caregivers, trainers, researchers, and administrators at all levels of health care and all cadres of staff from the community level to the national level.

CANCER TRAINING: CAPACITY BUILDING STRATEGY

Stakeholder Involvement

Stakeholders must be involved from the beginning of the process. This must include policy makers in the country, local county government personnel, community partners, key opinion leaders, and in-country experts in the field. Other important stakeholders include funding partners, collaborating partner institutions, groups or societies, selected academic institutions, and hospital training facilities, where the clinical aspects of the training will take place. This involvement early in the process is important to the introduction of the buy-in from the planning phase.

Key/Point-Person Training

These stakeholders should identify a smaller group of key personnel that will require additional training in program development and project management, which is crucial to a thorough needs assessment. There are many competing needs in LMICs. The ability to balance general needs and priority needs requires the leveraging of existing infrastructure through brainstorming sessions followed by a deliberate planning session. This work is required for both efficiency and effectiveness of the process. If the stakeholders are well represented and engaged, then the uptake of such a program will be quicker and sustainable.

NEEDS ASSESSMENT

A needs assessment involves the identification of the extent of the cancer problem, including the common causes of morbidity and mortality in patients with cancer, as well as the prevalence, common cancers, and resources available both locally and from outside sources. This needs assessment should be detailed, which provides a better opportunity to determine which resources can be availed in relatively short times that have greater likelihoods of faster implementation of the process.

CONSENSUS BUILDING

A critical step in the process is consensus building. This is when the needs assessment team unveils the report on all aspects of the priority areas; for example, the team might ask questions about what the cancer problem is like in the country or what the priority areas in cancer control should be. Here, all of the available information on educational deficits, as well as infrastructural, research, and training needs, will be presented. This usually occurs during a second or third stakeholders meeting, during which the meeting format is as interactive as possible to allow all or at least most of the sticking points to be addressed.

PROCESS LEADERSHIP OR CONSORTIA/ ORGANIZATIONAL STRUCTURE

The leadership of this process is a major determinant of its success or failure. Creation of an organogram that has specific outlined titles, interactions, functions, goals, and activities is paramount. This ensures a common ownership, a shared vision and mission, and clear, unambiguous expectations. The leadership is drawn from the collaborating partners or consortia. A mirrored organogram is important in North-South or South-South relationships to identify a codirector or counterpart for every major leadership role. This ensures that both groups own the undertaking as a collaborative effort that is grounded in mutual respect, shared responsibilities, and common purpose. In addition, this offers an internal self-regulation mechanism that has opportunities for bidirectional mentorship and growth in leadership skills. A team is assigned to collate all of the information from various curriculum drafts, with corrections from various stakeholders, in conjunction with the institution's curriculum development office or committee, to ensure that the final version is disseminated to all participants involved in the process. The final approval of the curriculum lies with the local curriculum development personnel, who must ensure that the necessary clearances are completed before the initiation of the program.

GENERAL PRINCIPLES FOR BUILDING CAPACITY IN TRAINING IN LMICs

The following are general principles for building capacity: First, the training must be conducted in the context of provision of care services. Second, it must involve stakeholders from the beginning of the planning process. Third, it must identify local key persons to prioritize the training needs vis-à-vis the resources. Fourth, participants must collaborate with existing training institutions and strengthen them. Fifth, the program must ensure a clear organizational structure, with goals, objectives, and responsibilities for all involved. Sixth, the program must tailor the length and breadth of the training to local cancer burden and needs. Seventh, the program must ensure local ownership and involvement at all levels. Finally, the program must make a collaborative sustainability, monitoring, and evaluation plan.

THE WESTERN KENYAN EXPERIENCE: CARE LEADS THE WAY

Kenya is a prototypic LMIC in sub-Saharan Africa, where cancer is the third-most common cause of death. In Kenya, an estimated 40,000 new cancer cases and greater than 28,000 cancer deaths occur annually.¹² The majority of the patients with cancer in this region present in advanced stages. Only five medical oncologists, five radiation oncologists, and three radiation physicists serve a population of 44 million people. This lack of adequately trained cancer specialists has continued to plague cancer care in Kenya. The lack of any formal training program in the country at a specialist level to expand the cancer workforce compounds the problem. It is against this backdrop that the Academic Model Providing Access to Health care (AMPATH) embarked on the development of an in-country training program for middle-level health professionals in oncology.

AMPATH (initially coined for the Academic Model for the Prevention and Treatment of HIV/AIDS), was created in 2001 to address

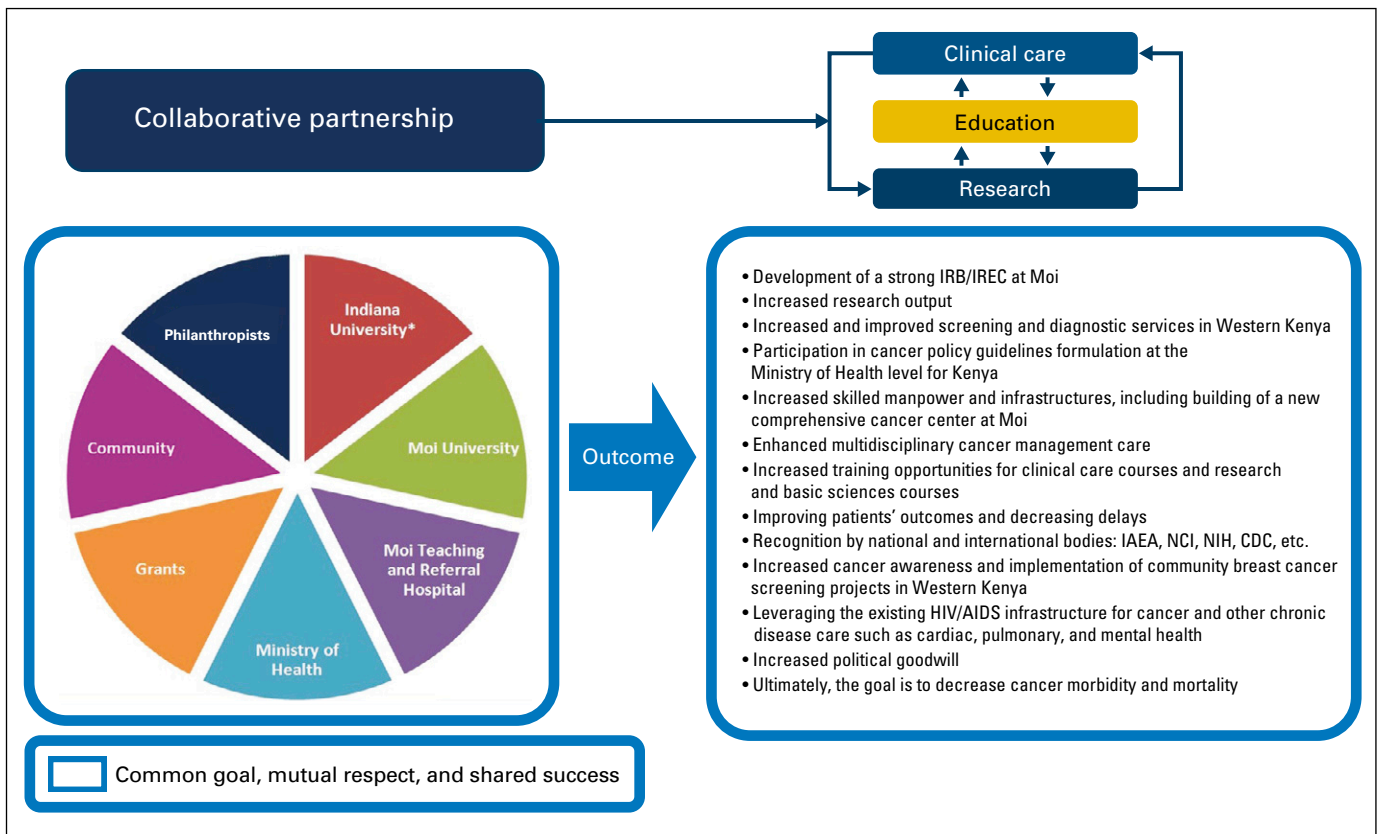


Fig 1. The Academic Model of Providing Access to Health care (AMPATH) model: leading with care. CDC, Centers for Disease Control and Prevention; IAEA, International Atomic Energy Agency; IRB, institutional review board; IREC, institutional research and ethics committee; NCI, National Cancer Institute; NIH, National Institutes of Health. (*) Indiana University, leader of the North America Consortium (other members: University of Toronto, University of Massachusetts, Brown University, Duke University, Indiana Hemophilia and Thrombosis Center, among others).

HIV/AIDS endemicity in Western Kenya. Through collaboration between the Moi University School of Medicine, the Moi Teaching and Referral Hospital (MTRH), and a consortium of North American academic medical centers led by Indiana University, AMPATH created a model for the treatment of patients beyond simply the provision of access to antiretroviral drugs for HIV-positive patients.^{9,13,14} Greater than 160,000 patients are currently enrolled on its HIV care program. AMPATH has grown from its original mission and has expanded to encompass primary health care and chronic disease management. Figure 1 shows some of the outcomes of the partnership. Figure 2 shows the matching growth in publications in revered journals.

AMPATH emphasizes the provision of clinical care first to mitigate the effects of the chronic diseases on the population before initiation of research and training for an ethically sound and effective program.

AMPATH Oncology developed from the HIV/AIDS infrastructure that was in existence in response to the burgeoning growth of the patient population with cancer, with or without HIV/AIDS. As outcomes for patients with communicable disease such as HIV improved, chronic diseases, such as cancer, have emerged as the second health wave crisis.^{15,16} The growth of AMPATH Oncology was initially hampered by available resources and clinical demands from adult and pediatric oncology. AMPATH Oncology transitioned eventually into care for AIDS-related malignancies and then to broader-based cancer treatment services. Most recently, a formally structured model of rationed care became commen-

surate with the resource constraints and population burden of Western Kenya that includes clinical care and education in screening, early diagnosis, treatment, and palliative care services.

EDUCATIONAL DEFICITS AND TRAINING

After the education and training needs were established as priorities, AMPATH Oncology identified the key areas of various levels of training, as shown in Table 1.¹⁷ There was need for both short courses and

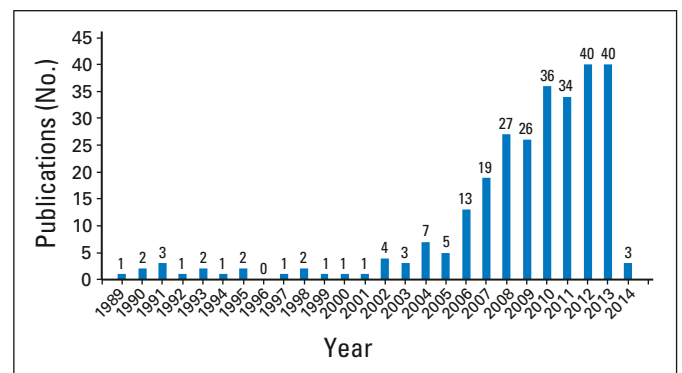


Fig 2. Academic Model of Providing Access to Health care (AMPATH) research output: matching the growth.

Table 1. Levels of Training and Output at AMPATH

Level of Training	Course to Be Offered	Example of Cadres/Skills	AMPATH Trained/Output	Duration of Training
Upper level				
Masters degree	Epidemiology, oncology fellowships	Oncology or radiation nurses	Gynecologic oncologists (2)	2 years
	Medical, surgical, radiation, and palliative	Medical/surgical/radiation	(4 in training)	
	Behavioral sciences, biostatistics	Oncologists, oncopathologists	Masters in clinical research (10+)	2 years
	Data managers, nursing, pathology	Epidemiologists, statisticians	Ethics in international research	1 years
	Gynecologic oncology	Behavioral scientists	Oncology nursing (curriculum under development)	2 years
Diploma/certificate course	Palliative care	Palliative and hospice care	Oncologists (developmental curriculum)	2 years
	Pathology	Pathologist role in cancer	Pathologists (4)	Variable
	Nursing	Chemotherapy competency	Chemotherapy nursing (> 60)	1 week
	Multidisciplinary	Cancer prevention module	Palliative care (> 40)	3-4 days
		Sickle cell training	Physicians (> 300)	3-4 days
Mentorship component	Clinical research, including clinical trials	Hemophilia training	All (> 600)	3-4 days
		Conduct of clinical research	All (> 600)	3-4 days
		Clinical trials establishment and conduct	> 60 trained (Multidisciplinary)	At least 12 months
				Part time
		Leadership and training of trainers	> 100 trained	1-2 day courses
Middle level				
Higher national diploma	(As described in this article)	Clinical officers	Clinical officers (12 in training)	18 months
		Nursing	Nursing higher national diploma oncology (curriculum under development)	12 months
Diploma and certificates		All	Skin punch biopsy (> 200 trained)*	1 day
			> 50 trained	6 months
Mentorship component	Clinical work and research, leadership; training of trainers			
Lower level				
Community nursing, lab technicians	Communication, prevention, risk factors	Community health workers		
Medical social workers	Patient education, cancer awareness	Social workers		
Community leaders/key personnel	Advocacy, debunking myths, cultural practices, health promotion	Sickle cell and hemophilia	> 3,000 people	3 days to 3 weeks
Community health workers		Clinical breast exam trainees		
Patient support groups and care navigators	Survivorship care, referral patterns, training of trainers	Cancer screening education, cancer referrals education		
Mentorship component	Creating cancer education materials in local languages and culturally sensitive		Periodic refresher training	

Abbreviation: AMPATH, Academic Model of Providing Access to Health care.

 *Skin punch biopsies.¹⁷

structured training for cancer specialists to adequately respond to the cancer pandemic in Kenya. Because the base knowledge and skills level differ between various cadres of health care workers, there are some courses that lend themselves to combined multidisciplinary approach type of training, whereas others are done separately to ensure consistency in the quality of outcomes.

SHORT COURSES

Early on, AMPATH Oncology offered short courses (usually 3 days to 1 week long) in palliative care that partnered with both local and international colleagues. Other courses included the following: chemotherapy competency, introduction to research ethics, and various symposia in breast, prostate, and cervical cancers, among others. Skills training—such as communication skills, chemotherapy administration skills, cervical cancer screening with visual inspection with acetic acid, colposcopy courses for physicians, and clinical breast exams—

also was included during these short courses. The audiences for these courses were multidisciplinary and included physicians, physician assistants (clinical officers), nurses, surgeons, pathologists, social workers, and radiologists. Hematology short courses have been established and include lectures in hemophilia and sickle cell disease.

In a partnerships with the American Society of Clinical Oncology (ASCO), AMPATH Oncology offered two 4-day, multidisciplinary cancer management courses (MCMCs) to all cadres of health care professionals in 2012 and again in 2013. During the MCMCs, various stakeholders led discussions about how to best address the cancer training needs in Western Kenya. A pie chart (Fig 3) shows the general representation of the 252 attendees at the conference and workshops during the 2013 ASCO-AMPATH-specific MCMC course. The objectives of this MCMC were to promote best practices in the treatment of breast, cervix, prostate, and head and neck cancer; to encourage attendees to discuss cases with other specialists to develop treatment plans; to increase the understanding of the roles and responsibilities of

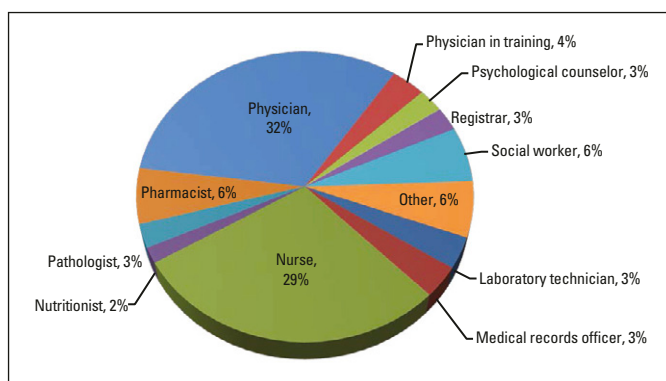


Fig 3. Attendee distribution by cadre at the 2013 American Society of Clinical Oncology (ASCO) Academic Model of Providing Access to Health care multidisciplinary cancer management course, Eldoret, Kenya (personal communication, Vanessa Eaton, ASCO International Affairs). Registrars were medical resident equivalents; physicians in training were any physicians undertaking any level of training on a full-time basis, including gynecologic oncology trainees, radiology trainees, and those working toward the Masters of Public Health.

oncology team members; to increase the ability to communicate with the patients and their families about cancer, treatment, and end of life care; and to increase the understanding of how to incorporate palliative care into treatment. In addition, courses on grant writing and leadership development were dovetailed with the MCMC.¹⁸

In the 2013 ASCO-AMPATH course evaluation, 96% of respondents indicated that they would make changes to their work on the basis of information learned during the course. In an evaluation of the 2013 ASCO MCMC, the majority of the attendees stated that they developed new skills to promote best practices in the treatment of breast, cervix, prostate, and head and neck cancer; best practices included how to obtain a tissue diagnosis for patients and how to stage accurately before treatment, the importance of discussing cases with other specialists for a multidisciplinary input in treatment plans, and an understanding of the roles and responsibilities of oncology team members. Greater than 95% of the attendees at the MCMC also stated that they learned how to communicate more effectively with patients and families about diagnoses, treatment options, and palliation, and that they learned how to incorporate palliative care into treatment plans for patients.

NEW SKILLS REPORTED BY MEETING TOPIC

In addition, several new skills were reported through topics presented at the MCMC meeting, as shown in Figure 4. These responses, coupled with our consortium needs assessment, led to the introduction of structured curricula courses in cancer management. One such course is the higher national diploma in oncology for clinical officers (physician assistant equivalents).

CLINICAL OFFICERS TRAINING IN ONCOLOGY

The registered clinical officers (RCOs), who are physician assistant equivalents in the US system, are distributed widely across Kenya. According to data from the Kenya Health Workforce Information System from 2006 to 2009, Kenya trained 5,647 new RCOs and

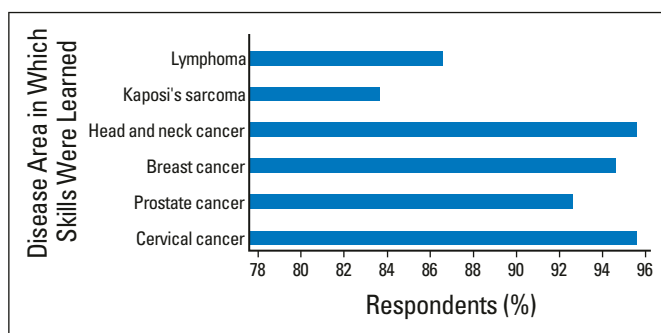


Fig 4. Respondent feedback: skills learned. "I learned new skills in the diagnosis, treatment, and multidisciplinary management of"

enrolled an average of 1,412 clinical officers per year; this contrasts with the 254 doctors per year enrolled during the same period.¹⁹ Therefore, the RCOs were a natural progression in our efforts to improve cancer care by increasing the training of our workforce. The RCOs are the most efficient means to impact the rural population of Kenya because of the cost and duration of training, urgency, infrastructure, public health systems retention potential, and creation of career development for the middle-level professionals. In addition, mid-level care providers are deemed less exportable, so their training improves workforce retention and return on investment.^{20,21}

Drawing from the ASCO/ European Society of Medical Oncology (ESMO) global oncology curriculum,²² the Kenya cancer control strategy of 2011 to 2016²³ used local experiences and expertise to assist in the development of such a curriculum. Trainers were cognizant of the duration of the training and the cadre of staff to be trained; objectives were identified for this 18-month training program.

OBJECTIVES OF THE TRAINING PROGRAM

The training program had nine main learning objectives: to develop professionals who can raise awareness about cancer and carry out screening programs, prevention, and community education; to carry out in a multidisciplinary setting the diagnostics, treatment (under supervision), management, and rehabilitation of patients who have cancers with timely referrals; to acquire skills in palliative care and counseling, and to participate in multidisciplinary teams that care for patients with cancer; to demonstrate leadership and management skills for health services at all health care levels; to apply research skills in clinical practice and in the delivery of health services to patients with cancer; to learn and apply knowledge of computing and information technology in health; to use effective communication skills in health care delivery; to understand and apply appropriate standards of ethics and professionalism in cancer care; and to ensure participation in continuous professional development in cancer care.

PROGRAM CONTENT

To achieve the above program objectives, multiple topics were taught in mixed formats—which included lectures, small group discussions, report writing, problem-based learning, didactic learning, and community attachments—over 18 months of training. The modules were as follows (see Data Supplement for detailed content summary): basics

of scientific principles; basic principles in management of malignant diseases; management of individual cancers; skills training, which included communication skills, computer skills, bone marrow biopsy skills, chemotherapy administration skills, and management skills; bioethics, legal, and economic issues; psychosocial aspects of cancer; research methodology and research projects; leadership, health management, and health information systems; and patient and community education and community health.

OUTCOME MEASURES

The outcome measures and competencies were multifaceted and included summative assessments; direct clinical encounters; community health placement reports; and monthly evaluations from peers and clinic workers, which included nursing staff, administrators, social workers, and clinic supervisors. Other tools used were log books, observation during clinical patient contact, focus group discussions, and questionnaires.

As per Dundee outcomes,²⁴ the following competencies were evaluated: clinical skills, practical procedures, investigating a patient, patient management, health promotion and disease prevention, communication skills, and handling and retrieval of information.

Outcomes 8 to 10 corresponded with how the trainees approached the seven competencies described in the first category: with an understanding of basic, clinical, and social sciences and underlying principles (outcome 8); with appropriate attitudes, ethical understanding, and understanding of legal responsibilities (outcome 9); and with appropriate decision making skills, clinical reasoning, and judgment (outcome 10).

Outcomes 11 to 12 were concerned with the personal development of the trainee as a professional—the personal intelligences. For example, outcome 11 was an understanding of the trainee's role in the health service management, research, and clinical duties; outcome 12 was an aptitude for personal development and a demonstration of appropriate transferable skills (eg, becoming a self-learner and becoming able to assess his or her own performance and recognize that learning is not static but lifelong). On the basis of the assessments done so far on the first 12 trainees, it is evident that there is mastery of new skills, including the ability to satisfactorily perform bone marrow biopsies, to administer chemotherapy, and to develop research proposals and case presentations. The formative assessments have also shown remarkable improvement in the level of knowledge, communication skills, and confidence in the management of care for patients with cancer in a multidisciplinary setting. In the assessment of the program by the trainees, all were satisfied with the course, its organization, and the course material, and they were confident in the management of care for patients with cancer through application of the knowledge, skills, and attitudes already acquired.

DISCUSSION, CHALLENGES, AND RECOMMENDATIONS

From 1-year evaluation at AMPATH Oncology: At the onset, none of the clinical officers was competent in essential skills in oncology, such as performance of bone marrow aspirate and biopsies, chemotherapy administration, or aspects of conduct of clinical research. As the participants gain more confidence, there is increased trainee participation

in campus-wide programs, such as tumor board presentations, breast and cervical cancer screening programs, and patient and family education. There is an overall improvement in the continuous assessment scores of trainees over time. The relatively poor performance in the basic principles at the beginning of the training is attributable in part to the variable levels of knowledge of the trainees at the beginning of the course. Of note, the trainees chosen were also able to afford the training fee of 2,000 USD for the 18-month training. We recommend a rigorous selection and an entrance examination to ensure that a baseline assessment of the knowledge of potential trainees is done before subjecting them to additional specialization. In addition, financial sponsorship of trainees by the government and other stakeholders can ensure a level playing field for these specialists. In Kenya, it is universal for medical training programs to charge a fee to facilitate the programs and ensure the sustainability of those programs. This does not deter more suitable candidates from applying to those programs but ensures that those who are sponsored by various organizations for such trainings have an extra burden to perform exceptionally to maintain their sponsorships and, for some, to gain potential future employment.

As with many new programs, this program has experienced some teething problems, which was discussed with the trainees in focus groups. Issues raised included the lack of hard copies of recommended books and journals for the program (the program relies heavily on electronic copies, but some trainees had to share computers). Faculty also demonstrated variable levels of expectations in various clinical areas, and trainees sometimes lacked adequate supervision, especially in their community health rural attachments. To address these concerns, textbooks are being sourced to stock the library, and the training school is developing an induction course for the faculty for this course to ensure consistency in teaching and expectations from both the trainees and their trainers. In addition, the establishment of a formalized AMPATH training institute at MTRH that is under discussion will greatly alleviate some of these teething issues. Faculty for this course was drawn largely from Moi University and MTRH, and most had received oncology-related training through the AMPATH consortium. This ensured few expatriates involvement and more local ownership of the course, which may translate to sustainability of the program.

The quantifiable patient-related outcomes attributable to the program are premature to evaluate; however, it is noticeable that the time from check-in to physician encounter in the clinic has markedly reduced because of the additional manpower in the clinics, and there is a high level of multidisciplinary care for most patients seen at our center. Of note, the research projects are well conceived and address an immediate need in the communities. Some examples of these project titles are as follows: factors contributing to loss to follow-up in cancer patients in Western Kenya; integration of cervical and breast screening services in maternal child health clinics in a rural facility; quality of life of breast cancer patients seen at MTRH; and cancer as part of community health education in a rural facility. These projects exemplify the breadth of topics, and, more importantly, they identify research relevant to the context of the clinical environment in Kenya.

In conclusion, subspecialty training in oncology for physicians in Kenya has always been found outside the country, which has the adverse consequences of being expensive and of having a risk that trainees will choose not to return home. AMPATH Oncology is one of creative approaches in cancer training and education because of its

task shifting, task sharing, and skills training of the mid-level cadres of health care professionals in Kenya. We believe that these efforts can be replicated in other LMICs, with an increased retention of the health care workers in the countries where the need for cancer professionals is greatest. Short-term training in cancer care, although espoused as realistic by many, is contrary to the reality on the ground in terms of the overall quality of training provided to the short-term trainees.

We have demonstrated that, with adequate planning and collaboration among the stakeholders, the development of a formal long-term training program for mid-level health care workers is feasible and should be expected to increase production of highly trained oncology manpower for the local population. This training also will strengthen the multidisciplinary cancer management teams, as encouraged by ASCO and Union for International Cancer Control, at various institutions because of the increased participation and inputs from the mid-level professionals.^{25,26} ASCO and ESMO can additionally help to improve the quality of these training programs in LMICs by assisting in curriculum development; training methodologies; assessment, monitoring, and evaluation; and provision of cancer modules online that can be shared with these training programs. Opportunities at the ESMO or ASCO annual meetings could be explored for LMICs to share experiences, successes, and challenges of such programs.

There are obvious gaps that remain unfilled, such as the cost of cancer services and infrastructure, among other deficits.

AMPATH Oncology is in the advanced stages of establishing a board certification fellowship program for medical oncology and

oncology nursing in collaboration with Indiana University and the University of Toronto. This will ensure that we can take advantage of existing health systems while we amalgamate resources to minimize waste and optimize cost-effective use. A gynecologic oncology program is already established.

This AMPATH Oncology model also is representative of how a public tertiary hospital like MTRH in an LMIC setting can leverage its resources, collaborate with partners from high-resource countries, and assist in the development of a training center to spearhead a sustainable education program.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Disclosures provided by the authors are available with this article at www.jco.org.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Medical Education and Training: Building In-Country Capacity at All Levels

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